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northward and westward of it, and the eastern point of Tongatabu will then be clearly seen, and cannot be mistaken. Abreast of Eua Eki we picked up a native pilot, and bore up for the opening between that island and the E. point of Tongatabu, which is the entrance to the anchorage on the northern side of the island.

No stranger should attempt this passage without a pilot; and at first sight it appears almost impossible to take a ship through the different windings between the coral reefs.

In running up you have the shore of Tongatabu on the left hand, and a number of small wooded islets on the right; all the shores being edged with coral reefs, which are generally breaking, and for the most part dry at low water. About halfway through the channel there is an awkward turn, with two sunken rocks in the centre, contracting the channel to less than a cable's length, steep until you pass to the westward of these rocks. With the exception of this turn, the channel is of good width, and within the passage it spreads out into an apparently clear, broad sheet of water, edged on the outside by small islets.

The Meander ran in and anchored within 400 yards of the edge of the flat reef which runs off the shore, just abreast of the church, in 17 fathoms water; sandy bottom. There are no high leading marks for the passage; but from the bowsprit-end or fore-yard all the dangers may be seen. With the danger from sunken rocks, no ship could work through the turns; and the passage should never be attempted without a commanding fair wind, the tide setting in different directions over and between the coral reefs.

## VII.—*Notes on the Distribution of Animals available as Food in the Arctic Regions.* By AUGUSTUS PETERMANN, Esq., F.R.G.S., &c.

Read Feb. 9, 1852.

THE occurrence of animals in the Arctic Regions, and its bearing on the missing expedition under Sir John Franklin, is a subject which has of late excited a good deal of interest, and has given rise to the most conflicting and contradictory opinions: some maintaining the existence of animals in the Arctic regions in great numbers, affording abundance of food to man; others as stoutly insisting upon the extreme scarcity, if not total absence, of them.

On entering, however, into an analysis of all that has been said and written on this point, it appears that a too confined view has been generally taken of the subject. Individual observations in certain localities have been separately considered and reasoned upon for the entire region, and these localities only related to a comparatively small space on the American side, the whole Asiatic side of the Polar basin not being taken into account at all. Again, it has been commonly assumed that with ascending latitudes temperature descended, and animal and vegetable life decreased, attaining their minima at the Pole. Nothing could be more fallacious than such an hypothesis in a region where the temperature corresponds less with latitude than in any other part of the globe. When, therefore, the shores and waters of Wellington Channel were found to be "teeming with animal life," it was regarded as a wonderful fact that more animals should be found in that region than in those to

the south of it ; whereas this fact would seem to find an explanation when connected with other physical features. Indeed, the consideration of isolated facts alone can lead to no correct result ; and it is only when the various natural features are compared and considered in their relative bearing, that the laws which govern nature can be traced and discovered. It is in this manner only that Physical Geography becomes a really useful and practical science.

In the following outline it is attempted to take a comprehensive, though rapid, glance of the distribution of animals within the Arctic regions generally, and to inquire into the causes of certain apparent abnormalities.

I will, in the first place, proceed to indicate the regions to which these remarks refer ; those, namely, which comprise the Arctic fauna. On this point I have adopted narrower limits than other authors, inasmuch as I have taken the northern limit of woods as the southern boundary of the region under consideration. It is true that some Arctic animals, like the reindeer, are found to the S. of this line—still these are not exclusively Arctic in their character, and they are also, more or less, of migratory habits. The ice-fox, a beautiful little animal, well known to Arctic voyagers, and decidedly of Arctic character, does not in general extend to the S. of the line assumed ;\* which also coincides with the extreme northern limit of the reptiles, and corresponds pretty closely with the line of 50°, mean summer temperature. The region thus comprises Iceland, Spitzbergen, Novaia Zemlia, the extreme northern shores of Europe and Asia, with the north-eastern extremity of the latter, including also the sea of Kamtchatka and the Aleutian Islands, but excluding the peninsula of Kamtchatka. On the American side it comprises a considerable portion of British North America, the northern part of Labrador, and the whole of Greenland.

Though several classes of the animal creation—as, for example, the reptiles—are entirely wanting in this region, those of the mammals, birds, and fishes, at least bear comparison, both as to number and size, with those of the tropics,†—the lion, the

\* The only exception, I believe, where the Arctic fox ranges southward within the wooded district occurs in North America round Hudson Bay. This is owing to its habit of keeping as much as possible on the coast in migrating to the S. ; thus, while they extend along the shore of Hudson Bay to about 50° N. lat., towards the centre of the continent they are very scarce even in lat. 61°, and in lat. 65° they are only seen in winter, and then not in numbers.—(See Richardson, *Fauna Boreali-Americana*, p. 87.) Throughout the whole of the Asiatic and European north the range of the ice-fox is nowhere found to be within the wooded region, as Baer has shown in his masterly account of the distribution of this animal.—(See *Bullet. Scientif. publiée par l'Acad. Imp. de St. Pétersbourg*, tom. ix. p. 89.)

† Though the number of *species* is decidedly inferior, the immense multitudes of *individuals* compensate for this deficiency. Some years ago I wrote with

elephant, the hippopotamus, and others, being not more notable in the latter respect than the polar bear, the musk ox, the walrus, and, above all, the whale. Besides these, there are the moose, the reindeer, the wolf, the polar hare, the seal, and various smaller quadrupeds. The birds consist chiefly of an immense number of aquatic species. Of fishes, the salmon, salmon-trout, and herring are the principal, the latter especially occurring in such myriads as to surpass everything of the kind met with in tropical countries. Nearly all these animals furnish wholesome food for man. They are, with few exceptions, distributed over the entire region. The number in which they occur is very different in different parts. Thus, on the American side we find the animals increase in number from E. to W.—on the shores of Davis Strait, Baffin Bay, Lancaster Sound, Regent Inlet, fewer are met with than in Boothia Felix and the Parry Group. The abundance of animal life in Melville Island and Victoria Channel is probably not surpassed in any other part of the American side. Proceeding westward to the Russian possessions, we find considerable numbers of animals all round and within the sea of Kamtchatka, as also to the N. of Behring Strait. The yearly produce of the Russian Fur Company in America is immense, and formerly it was much greater. Pribylow, when discovering the islands named after him, collected within two years 2000 skins of sea otters, 40,000 sea bears (Ursine seals), 6000 dark ice foxes, and 1000 pood of walrus teeth. Lütke, in his voyage round the world, mentions that, in the year 1803, 800,000 skins of the Ursine seal alone were accumulated in Unalaska, one of the depôts of the Russian Fur Company; 700,000 of these skins

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regard to this point—"If we were to conclude from a large number of species that there must be a large number of individuals, we should come to erroneous conclusions, for such is frequently not the case. The Arctic and tropical countries furnish an excellent example, at least in their Mammalian and Ornithological Faunas. We need only refer to the crowds of birds which hover over the islands and shores of the north, or to the inconceivable myriads of penguins met with by Ross on the Antarctic lands, where there was not even the smallest appearance of vegetation; and, among the quadrupeds, to the thousands of fur animals that are annually killed in the Arctic regions. Wrangell gives a fine description of animal life in the Kolyma district of Siberia, one of the coldest regions of the globe: the poverty of vegetation is strongly contrasted with the rich abundance of animals; countless herds of reindeer, elks, black bears, foxes, sables, and grey squirrels, fill the upland forests; stone foxes and wolves roam over the low grounds. Enormous flights of swans, geese, and ducks, arrive in spring, and seek deserts, where they may moult and build their nests in safety. Eagles, owls, and gulls pursue their prey along the sea-coast; ptarmigans in troops among the bushes, and little snipes are busy along the brooks and in the morasses. Baer also relates that a walrus hunter on the rocks of *Novaia Zemlia* caught in a few hours 30,000 lemmings. On the other hand, in Australia, and other regions of the tropical and temperate zones, a traveller will frequently journey for weeks together, and pass over hundreds of miles of country, without meeting with a single quadruped."—See *Atlas of Physical Geography*, by Petermann and Milner, p. 130.

were thrown into the sea, partly because they were badly prepared, partly in order to keep up the prices. In the Polar Sea to the N. of Behring Strait, as is well known, the number of whales found is prodigious; during the last three years American whalers, at the rate of 150 every year, having been employed in that small portion of the ocean. But in no other part of the Arctic zoological region is animal life so abundant as in the north-eastern portion of Siberia, especially between the rivers Kolyma and Lena. A description of the Kolyma district has already been given in the preceding remarks, to which the following particulars may now be added. The first animals that make their appearance after the dreary winter are large flights of swans, geese, ducks, and snipes: these are killed by old and young; fish also begin to be taken in nets and baskets placed under the ice. In June, however, when the rivers open, the fish pour in in immense numbers. At the beginning of the present century several thousand geese were sometimes killed in one day at the mouth of the Kolyma; about twenty years later, when Admiral Wrangell visited that place, the numbers had somewhat decreased, and it was then called a good season when 1000 geese, 5000 ducks, and 200 swans were killed. Reindeer hunting forms the next occupation of the inhabitants. About the same time the shoals of herrings begin to ascend the rivers, and the multitudes of these fish are often such, that in three or four days 40,000 may be taken with a single net. On the banks of the river Indigirka the number of swans and geese resorting there in the moulting season is said to be much greater even than on the Kolyma. West of the Lena, and along the whole of the Siberian shores as far as Novaia Zemlia, and including that island, animal life presents a great contrast to the preceding portion, as it is nowhere found in such abundance as in the districts already described, and in many parts it is extremely scarce. Spitzbergen, although possessing considerable numbers of animals, especially reindeer of the best description, is greatly inferior to north-eastern Siberia in that respect.

Having now completed this circumpolar view of the distribution of animals, its causes remain to be considered.

The development of vegetable and animal life in the Arctic regions chiefly depends on the warmth of two or three, or even one summer month; and it may be in general assumed that where the summer warmth is the highest, there plants and animals will be found in greater number and bulk than in other regions where the temperature is lower. This assumption is found to be correct as far as actual observations have been extended. The distribution of temperature in the Arctic regions and its causes I have elsewhere\* discussed; in this place the summer temperature

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\* See Petermann's 'Search for Franklin,' 1852.

only requires to be considered. To afford, however, the elements of a complete view of the distribution of temperature within the frigid zone, I have collected the observations made at various points, including some interesting stations not strictly belonging to the Arctic regions: these results are given in the Table (pp. 126, 127), and enumerated with respect to latitude.

According to Sir John Richardson, terrestrial animals are abundant in the polar regions for two short summer months only. Birds fly to the N. to perform the functions of incubation and rearing their young, which done, old and young, with the exception of some scattered flocks of dovekies, desert their breeding-places, and, with the frost, wing their way southwards. Reindeer, musk-oxen, and the beasts of prey which follow in their train, do not quit the continent to visit the Polar islands until the thaw has made some progress in thinning the snowy covering of the pastures, and they return towards the woodlands again as soon as the sea is fast, or sooner, if the straits which separate their summer haunts from the main are narrow enough for them to swim across. The temperature of the month of July, which corresponds with the summit of the summer, appears to be a pretty sure index of the occurrence or abundance of animals in those regions. The following table exhibits the places of the lowest mean July temperature of the American half of the Arctic regions, being all below 40° :—

Winter Islands . . . .	(latitude $66^{\circ} 11'$ )	. . . .	$35^{\circ} 4'$
Port Bowen . . . .	( „ „ $73^{\circ} 14'$ )	. . . .	$36^{\circ} 6'$
Assistance Harbour . . . .	( „ „ $74^{\circ} 40'$ )	. . . .	$37^{\circ} 8'$
Igloodik . . . .	( „ „ $69^{\circ} 21'$ )	. . . .	$39^{\circ} 1'$

Observations made on board of vessels navigating Baffin Bay and Hudson Strait give the following additional results:—\*

	Mean Latitude.	Mean Longitude.	Mean Temperature of July.
	° /	° /	°
Baffin Bay . . . .	70 0	59 0	33·5
Baffin Bay . . . .	70 0	58 0	34·8
Baffin Bay . . . .	75 5	59 4	34·9
Hudson Strait . . . .	63 0	77 0	35·3

An elliptical curve drawn round the foregoing points, having as its axis a line extending from the entrance to Hudson Strait to Assistance Bay, and including Davis Strait, Baffin Bay, Lancaster Sound, Barrow Strait, Prince Regent Inlet, Boothia Gulf, Fox Channel, with the land between, comprises the coldest

\* As given by Dr. Sutherland in his 'Journal of a Voyage to Baffin's Bay and Barrow Strait.' See Appendix, p. clxxvi.

regions on the American side. This region is precisely that in which the fewest numbers of animals have been met with. Beyond it, even to the N., where the July temperature—as in Melville Island—has been found to increase, there the animals also have been found in greater numbers. Dr. Sutherland, in his valuable work already quoted, gives some interesting remarks on this head. He says,\* “That deer are more abundant on the N. side of Cornwallis Island, adjacent to Barrow Strait, no person need doubt; for Captain Penny’s and Mr. Goodsir’s travelling reports contain frequent allusions to the numbers of these animals that were seen there; while not one, so far as I know, was ever seen during the whole year in any of the frequent excursions made from the ships in Assistance Bay.” Again: “It will be rather peculiar if we find that these animals take towards the N. side of Cornwallis Island as the winter approaches, that they may share the modifying effect which the open water in Queen’s Channel must have upon the atmosphere in its vicinity; and it will appear at variance with the generally received opinion that these animals migrate southward on the approach of winter.” It would have been interesting if a series of observations of the temperature in the regions referred to by Dr. Sutherland could have been made, so as to draw a comparison in that respect with Assistance Bay.

In Wolstenholme Sound, at the head of Baffin Bay, though having a July temperature of  $40^{\circ} 5'$ , a comparatively small number of animals were observed by the expedition of the ‘North Star.’ This is a point, however, from which animals can easily migrate to the S. or N.; and if the temperature be higher farther N. during the summer, as is highly probable, they unquestionably would extend their migrations in that direction. Dr. Sutherland has an interesting remark bearing on the point:—

“The Esquimaux lad whom Captain Ommanney took on board H.M.S. ‘Assistance,’ at Cape York, says that the Esquimaux who inhabit the coast in the vicinity of Whale Sound, at the top of Baffin Bay, clothe themselves with the skin of the musk-ox (uningmak). This statement, if true, would lead one to the idea that the musk-ox inhabits still more northern regions than Melville Island—regions whence they cannot return into a more southern latitude with the close of the season, owing to the open water in the top of Baffin Bay throughout the whole winter. And moreover, it may lead to the inference that such regions as can maintain the musk-ox throughout the year in so high a latitude as  $77^{\circ}$  and upwards must present features with respect to temperature which are peculiar only to regions in the vicinity of an extensive sea.”

On the Asiatic half of the Arctic regions the July temperature stands as follows:—

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\* ‘Journal of a Voyage to Baffin’s Bay and Barrow Strait,’ Introduction, p. xxxii.

Spitzbergen, N. W. extremity . . . . .	(latitude 80° 00')	. . . . .	36° 0
Novaia Zemlia, Karische Pforte . . . . .	(,, 70 37)	. . . . .	36° 3
Ditto, Seichte Bay . . . . .	(,, 74 00)	. . . . .	37° 7
Ditto, Matothkin Shar . . . . .	(,, 73 00)	. . . . .	40° 0
Spitzbergen, Hecla Cove . . . . .	(,, 79 55)	. . . . .	40° 2
Kovennoy Filipovskoy . . . . .	(,, 71 05)	. . . . .	48° 8
Ust Yansk . . . . .	(,, 70 58)	. . . . .	58° 6
Nishnei Kolymsk . . . . .	(,, 68 32)	. . . . .	61° 0

In this region the influence of the temperature is still more striking, as it has been shown that north-eastern Siberia, comprising the warmest stations in the foregoing list, exhibits not only the greatest amount of animal life in northern Siberia, but throughout the whole of the Arctic regions, although in winter it is the coldest on the face of the globe. It will be seen, by comparing the two tables of the July temperature, that Winter Island is the coldest of all stations; and this is likewise the case with the mean of the three summer months. This place is consequently the Pole of cold of the northern hemisphere during the summer; and Mr. Berthold Seemann, the naturalist of H.M.S. 'Herald,' informs me that it is likewise the phytological North Pole, namely, that point which possesses the smallest number of genera and species of plants, and whence the number increases in every direction. While thus in Winter Island the most scanty vegetation is found, in north-eastern Siberia, in a corresponding latitude, noble forests are known to thrive in considerable extent. It is curious to remember that already that distinguished navigator Frobisher, nearly three hundred years ago, in describing the country round the Strait named after him, says that under a latitude of 62° it was colder there than in Wardöhuus in Europe in latitude 70½°, the former being comprised in the district I have shown to be the coldest in summer in the Arctic regions as far as our present knowledge extends. It is much to be regretted that the efforts of the numerous Arctic expeditions in this century—in the hope to effect the so-called "North-western" passage—should have been almost exclusively directed and accumulated upon that region,—the most desolate, and, perhaps, the most uninteresting, as well as the most difficult and dangerous portion of the Frigid Zone.

Without going further into detail, I will merely add a few words as to the bearing of the foregoing observations on Sir John Franklin's Expedition.

The general opinion is that the missing vessels have been arrested somewhere between Wellington Channel and Behring Strait and the Siberian shores. Most probably their position is nearer to the latter than to the former points. As these three regions abound in animal life, we may fairly conclude that the intervening portion partakes of the same character, and moreover,



that the further Sir John Franklin may have got away from Wellington Channel, and the nearer he may have approached the north-eastern portion of Asia, the more he will have found the animals to increase in number. The direction of the isothermal lines corroborates this assumption, as they are indicative of a higher summer temperature in that region than in any other within the Polar basin. Those countries being probably uninhabited by man, the animals there would have continued unthinned by the wholesale massacres by which myriads are destroyed for the sake only of their skins or teeth.

An interesting fact was mentioned in this Society by Lieut. Osborn, namely, that Captain Penny, in September, 1850, had seen enormous numbers of whales running southwards from under the ice in Wellington Channel. We know this to be also the case in the Spitzbergen Sea every spring, and that these animals are numerous along the Siberian coasts. This not only tends to prove the existence of one, or perhaps two, Polar Seas, more or less open throughout the year, but also that these seas abound in animal life, as to satisfy enormous numbers of whales a large amount of food is required. And it is well known among the Tchuktchi, on the north-eastern coasts of Siberia,—where land to the N. is said to exist in contiguity and probably connected with the lands discovered by Captain Kellett,—that herds of reindeer migrate between those lands and the continents.

Taking all these facts into consideration, the conclusion seems to be a reasonable one, that Franklin, ever since entering Wellington Channel, has found himself in that portion of the Arctic regions where animals probably exist in greater plenty than in any other. Under these circumstances alone his party could exist as well as other inhabitants of the Polar regions; but we must not forget that, in addition to the natural resources, they would in their vessels possess more comfortable and substantial houses than any of the native inhabitants.

So far as food is concerned, reasonable hope therefore may be entertained that the missing Expedition would not altogether suffer by the want of it;—their fate, however, depends upon other circumstances as well, among which, that dire scourge of mariners, the scurvy, is probably more to be feared than any other.

My authorities have been the works of the various expeditions undertaken in the Arctic regions by the English, Russian, Dutch, and other nations; the zoological accounts of Richardson, Baer, Wrangell, and others; also the valuable papers on the distribution of mammals by Dr. Wagner. The meteorological data are chiefly derived from Dove's tables, and the works of Richardson, Sutherland, Middendorf, and others.

## TABLE.

## THERMOMETRICAL OBSERVATIONS in the ARCTIC

		Lat. N.	Long. W.	Elev.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.
	Lat. 80° to 75°.	° /	° /	Feet.								
1	Spitzbergen . . .	80 0	- 10 0	..	..	..	..	..	..	33·71	35·98	33·80
2	Hecla Cove . . .	79 55	16 49	..	..	..	..	..	..	35·86	40·17	38·40
3	Greenland Sea . .	78 0	..	..	..	..	..	14·23	22·52	31·37	37·00	..
4	Wolstenholme Sound	76 33	30 0	..	-25·07	-34·02	-17·47	-3·74	25·82	39·73	40·52	33·67
	Lat. 75° to 70°.											
5	Melville Island . .	74 47	110 48	..	-31·28	-32·45	-18·19	-8·21	16·82	36·21	42·45	32·59
6	Assistance Bay . .	74 40	94 16	..	-29·	-29·8	-22·4	-3·2	12·1	34·3	37·8	35·6 §
7	Novaia Zemlia . .	74 0	58 0	..	9·32	10·29	10·38	10·69	24·30	34·41	37·67	37·72
	(Seichte Bay).											
8	Port Bowen . . .	73 14	88 56	..	-28·91	-27·32	-23·38	-6·50	17·57	36·12	36·55	30·54
9	Novaia Zemlia (Ma- tothkin Shar).	73 0	- 57 20	..	4 28	- 7·74	4·46	8·25	19·74	34·57	39·97	40·93
10	North Cape, Island of Mageroe.	71 10	- 26 1	..	22·08	23·16	24·75	30·02	34·07	40·15	46 60	43·70
11	Kovennoi Filipovski	71 5	-118 0	..	..	..	..	- 4·	16·0	35·1	48 8	51·3
12	Ustyansk . . .	70 58	-138 24	..	-39·48	-31·18	-4·05	6·75	27·95	47·55	58·60	44·62
13	Novaia Zemlia, Ka- rische Pforte.	70 37	- 57 47	..	- 2·88	0·09	-10·68	3·13	17·51	32·95	36·30	37·51
	Lat. 70° to 65°.											
14	Boothia Felix . . .	69 59	92 1	..	-28·69	-32·02	-28·68	-2·59	15·65	34·16	41·26	38·69
15	Igloodik . . .	69 21	81 53	..	-16·13	-19·58	-19·01	-0·85	25·14	32·16	39·09	33·88
16	Nishne Kolymak . .	63 32	-169 56	..	-31·27	-22·59	-6·70	15·51	42·96	50·	61·77	..
17	Kotzebue Sound . .	68 0	163 0	..	..	..	..	..	..	..	52·33	43·
18	Fort Confidence . .	66 54	118 49	500	-21·57	-21·52	-20·21	-4·71	..	..	..	..
19	Fort Hope . . .	66 32	86 56	..	-29·32	-26·68	-28·10	-3·95	17·88	31·38	41·46	46·32
20	Eyafoord . . .	66 30	20 30	..	25·70	18·50	20·66	27·50	36·14	43·52	46·94	46·94
21	Winter Island . . .	66 11	83 11	..	-23·17	-23·99	-10·72	6·48	23·29	23·17	35·36	36·86
22	Yukon . . .	65 0	147 0	200?	-26·85	-26·44	-11·16	12·66	41·24	53·49	65·75	59·90
23	Fort Franklin . . .	63 12	123 13	500	-23·33	-16·75	-5·39	12·35	35·18	48·02	52·10	50·56
	Lat. 65° to 60°.											
24	Archangel . . .	64 32	- 40 33	..	6·57	9·23	21·90	31 39	41·68	55·18	60·82	57·58
25	Fort Enterprise . .	64 28	113 06	850	-15·57	-25·88	-13·48	5·78	31·20	..	..	..
26	Godhaab . . .	64 10	52 24	..	12·38	12 56	15·60	22·01	32·16	39·09	41·92	40·84
27	New Herrnhut . . .	64 10	52 40	..	9·05	22·10	21·65	24·80	32·	40·10	40·33	37·40
28	Reykiafiog . . .	64 8	21 55	..	29·82	28·31	29·86	36·46	44·80	51·58	53·19	52·86
29	Fort Reliance . . .	62 46	109 0	650	-25·00	-18·84	-6·14	8·23	36·03	..	..	..
30	Yakutsk . . .	62 1	-129 44	..	-45·47	-28·86	-6·43	16·36	36·91	53·28	68·79	53·10
31	Fort Simpson . . .	61 51	121 51	400	-12·54	-9·06	5·55	26·28	43·16	63·64	60·97	53·84
32	Pelly Banks . . .	61 30	130 0	1400	-21·95	-14·73	-0·99	20·44	..	..	..	..
33	Fort Resolution . .	61 10	113 51	500	0·42	-25·60	9·95	12·88	40·14	..	..	..
34	Lichtenau . . .	60 35	46	..	19·74	23·	27·63	32·43	39·27	43·09	45·37	41·09
	Lat. 60° to 55°.											
35	Friedrichsthal . .	60	45	..	19·62	18·72	22·10	27·50	..	..	..	..
36	Petersburg . . .	59 56	- 30 18	..	14·74	18·68	25·50	37·18	48·52	59·95	63·91	61·16
37	Fort Churchill . .	59 02	93 10	20	-21·21	-7·31	-4·63	16·29	28·42	44·69	56·80	53·39
38	Fort Chepewyan . .	58 43	118 20	700	-8·76	-4·01	3·08	19·80	45·40	55·00	63·00	58·10
39	Hebron . . .	58 0	64 0	..	-5·24	-5·31	4·62	16·83	33·01	36·61	43·37	49·10
40	Okak . . .	57 30	66 0	..	2·15	1·95	8·25	23·0	38·25	44·65	51·65	52·0
41	Nain . . .	57 10	61 50	..	0·95	3·51	7·52	29·97	36·23	42·53	50·18	50·99
42	Sitka . . .	57 3	135 18	..	34·18	33·60	38·01	40·64	43·18	53·83	57·11	57·79
43	York Factory . . .	57 0	92 26	20	-5·12	-6·60	4·77	19·21	33·53	47·67	59·99	51·85
	Lat. 55° to 47°.											
44	Oxford House . . .	54 55	96 28	400	-22·06	-1·90	8·57	28·62	38·01	..	..	..
45	Cumberland House .	53 57	102 17	..	-13·2	-1·1	12·1	35·	50·	58·8	61·8	56·2
46	Iluluk . . .	53 52	166 25	..	34·27	32·47	31·82	34·16	39·25	44·98	49·55	54·82
47	Rupert House . . .	51 21	83 40	20?	-4·09	-0·68	7·64	21·05	41·51	..	..	..
48	St. John's . . .	47 34	52 28	..	23·34	20·88	24·18	33·40	39·30	48·02	55·16	57·86
	London (for com- parison).	51 30	0 5	..	37·2	40·1	42·5	46·9	53·5	58·7	62·4	62·1

The longitudes are East when - is prefixed, and West when there is no sign.—\* Difference of the hottest Land.—S., Sutherland, 'Journal of a Voyage to Baffin's Bay and Barrow Straits.'—M., Middendorf, 'Reise tions are from Dove (17th and 18th Reports British Association, 1847 & 48).—‡ By interpolation.—§ From

TABLE.

REGIONS, arranged according to Latitude.

Sept.	Oct.	Nov.	Dec.	Winter.	Spring.	Sum.	Aut.	Year.	Differ. H. & C. Months. *	Differ. S. & W. †	No. of Yrs.	Hour of Observation.	Authorities
..	..	..	..	..	..	34.52	..	..	..	..	1	2-hourly.	R.
26.76	11.32	-18.60	-27.05	-28.53	1.59	38.15	..	..	..	..	3	hourly.	
						37.97	6.55	4.54	74.54	66.50	1	d. extr. 6 times.	
22.52	-2.83	-21.14	-21.62	-28.45	-3.19	37.08	-0.48	1.34	74.90	65.53	1	2 hourly.	S.
21.3	1.3	-6.7	-21.4	-26.73	-4.50	35.90	5.37	2.5	67.6	62.63	1	3-hourly.	
31.01	23.79	9.63	9.72	9.78	15.12	36.60	21.48	20.74	28.40	26.82	1	2-hourly.	
28.88	10.85	-5.00	-19.05	-25.09	-5.77	34.40	10.58	3.53	65.46	59.49	1	2-hourly.	
31.08	22.26	8.73	-3.42	-2.29	10.82	38.49	20.69	16.93	48.67	40.78	1	2-hourly.	
37.60	32.	25.77	25.74	23.66	29.61	43.48	31.79	32.14	24.52	19.82	1	..	
26.8	19.04	..	..	..	..	45.0	..	..	..	..	1	..	M.
18.25	-18.38	-25.24	-37.03	-35.90	10.22	50.26	8.52	4.01	38.08	86.16	2	8, 12, 4, 12.	
30.02	20.28	3.24	12.42	3.21	3.32	35.59	17.85	14.99	48.19	32.38	1	2-hourly.	
25.41	9.07	-5.41	-22.43	-27.71	-5.21	38.04	9.69	3.70	73.28	65.75	2	hourly.	
25.09	13.72	-18.65	-38.25	-31.32	1.76	35.04	6.72	5.55	67.34	56.36	1	2-hourly.	
20.97	0.30	-16.71	-23.60	-25.82	17.26	..	1.52	..	92.7	..	2	8, 8.	
34.04	..	..	..	..	..	..	..	..	..	..	2	daily, extr.	R.
..	19.43	-3.68	-38.69	-27.26	-4.73	39.39	13.93	9.7	75.64	64.68	1	13 to 17 times.	
28.57	12.56	0.68	-19.27	-25.09	-4.73	39.39	13.93	5.96	75.64	64.68	1	8 times.	
43.16	34.34	25.88	18.32	20.84	28.10	45.80	34.46	32.30	28.62	24.96	2	..	R.
31.61	13.25	7.88	-14.24	-20.47	6.35	31.80	17.58	8.82	60.85	52.27	1	2-hourly.	
38.66	21.60	-8.28	-18.43	-23.80	56.73	14.60	17.37	14.58	92.60	80.53	1	6, 6.	
41.00	22.47	-0.11	-10.88	-17.00	50.41	12.69	21.15	17.75	74.43	67.41	2	6 times.	R.
47.62	35.22	22.62	12.51	9.43	31.66	57.85	35.15	33.53	54.78	48.42	18	7, 2, 9.	R
31.59	21.75	-1.70	-30.54	-24.00	55.7	23.50	17.21	17.94	78.88	79.7	3	..	
35.65	29.84	21.94	17.49	14.14	23.26	40.62	29.14	26.79	29.54	26.48	13	10, 10.	
34.03	32.90	15.80	11.75	14.30	26.15	39.28	26.50	26.83	31.28	24.48	1	..	R.
46.45	36.91	30.45	29.41	29.18	37.04	53.54	37.94	39.43	27.88	24.36	14	d. extr.	
..	20.70	13.44	-17.07	-16.97	..	12.21	..	16.7	..	..	3	13 times.	
44.11	16.59	-22.41	-34.78	-36.37	15.61	61.72	12.76	13.43	114.26	98.09	2	5 times.	R.
49.10	24.28	8.53	-8.36	-10.	59.48	26.66	27.34	25.75	76.18	69.48	24	8, 8.	
..	..	..	-13.98	-16.88	..	..	..	..	..	..	3	3 times.	
..	26.06	12.04	-2.59	-8.09	..	20.99	..	21.7	..	..	3	8, 8.	R
39.70	35.58	26.13	22.41	21.72	33.11	43.18	33.80	32.95	25.63	41.46	2	..	R
..	32.45	35.15	29.75	22.70	..	..	..	..	..	..	..	..	I
51.31	41.38	30.38	22.57	18.66	37.06	61.68	41.02	39.61	49.17	43.02	13	7, 2, 9.	
36.03	26.50	3.32	-14.00	-14.17	51.63	13.36	21.95	18.19	78.01	65.80	1	3 times.	
43.53	33.00	19.13	2.76	-3.34	58.70	22.76	31.89	27.52	71.76	62.04	34	8, 8.	R
38.84	29.43	23.58	5.18	-1.79	18.15	43.09	30.62	22.52	54.41	44.88	2	..	
44.45	31.15	22.4	8.45	4.18	25.17	49.43	32.67	27.86	60.45	..	2	8, 12, 4, 8.	
44.98	33.98	26.51	6.51	3.66	24.57	47.90	35.16	27.82	50.04	44.24	3	8, 12, 4, 8.	R.
55.96	46.63	42.89	36.32	34.74	42.28	56.24	48.49	45.44	24.19	21.50	24	red.	
41.90	33.43	25.17	3.73	-2.53	19.17	52.07	33.50	25.63	66.59	54.60	1	3 times.	
..	17.53	13.29	-23.06	-0.82	7.51	..	..	..	..	..	3	7, 8.	R.
47.	36.9	13.	3.2	-3.70	32.37	58.93	32.30	29.98	75.00	62.63	1	..	
54.07	42.73	35.17	33.94	33.56	35.08	49.78	37.32	38.94	23.	16.22	14	8, 1, 9.	
..	34.80	23.33	15.59	0.14	0.78	..	..	..	..	..	3	3 times.	R.
53.04	44.50	33.98	25.32	23.18	32.29	54.01	43.84	38.33	36.98	30.83	5	daily extr.	
57.5	50.7	44.0	40.4	39.23	47.63	61.07	50.73	49.7	25.2	21.84	65	red.	

and coldest months.—† Difference of Summer and Winter.—R., Richardson, 'Boat-Voyage through Rupert's in the äussersten Norden und Osten Sibiriens.'—T., Transactions Royal Society.—The rest of the Observations to the 10th Aug. only.—|| 25—30 April.—¶ 1—26 October.